

FISHLIFE

Part 10 in a series about inshore fish of Hawaii. The 12-part series is a project of the **Hawaii Fisheries Local Action Strategy**.

NAME **ROI**



SCIENTISTS PROBE IMPACTS OF INVASIVE ROI ON LOCAL FISH

BY SCOTT RADWAY

IN MOST OF THE PACIFIC, ROI IS GOOD EATING. In fact, in many places, it's too good. Grouper is a slow growing fish and takes longer to reach a reproductive stage. As a result, it is often threatened by overfishing because it does not spawn enough to keep up with demand.

Not so in Hawaii.

The invasive fish was introduced in the '50s to boost declining local fish stocks, but today roi is one of the most despised fish on Hawaii reefs. In fact, people don't typically eat it here. And while roi, commonly known as the peacock grouper, might be dwindling elsewhere, it's thriving in Hawaii.

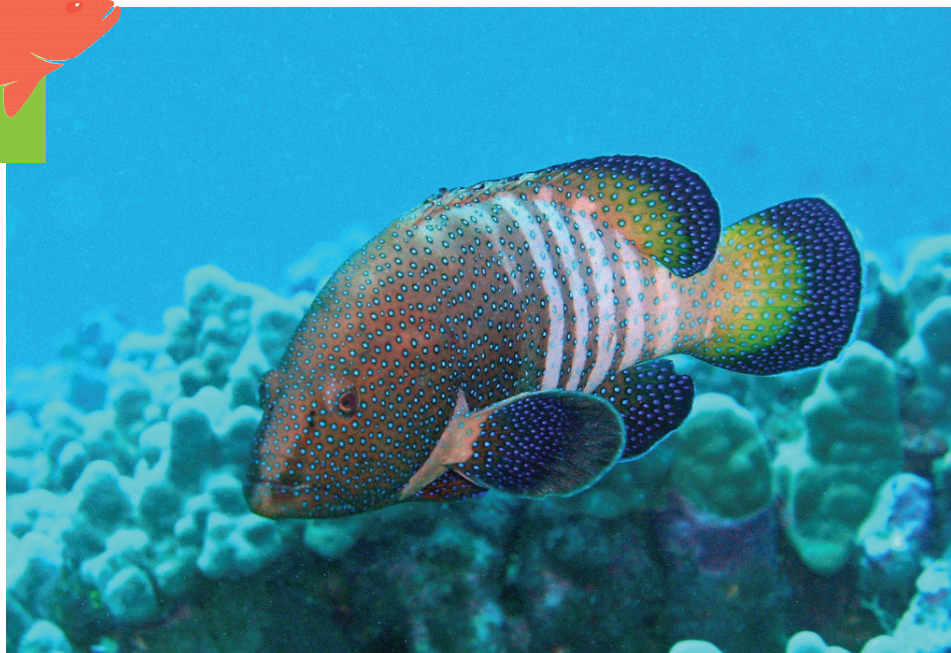


Photo: Bill Walsh/DAR

Jan Dierking, a University of Hawaii scientist and foremost researcher on roi in Hawaii, says roi today is the most dominant inshore predator in the Main Hawaiian Islands. That is a big reason for concern among fishermen, who have been raising the alarm that the fish is devouring native species, particularly ones that are commercially and recreationally prized.

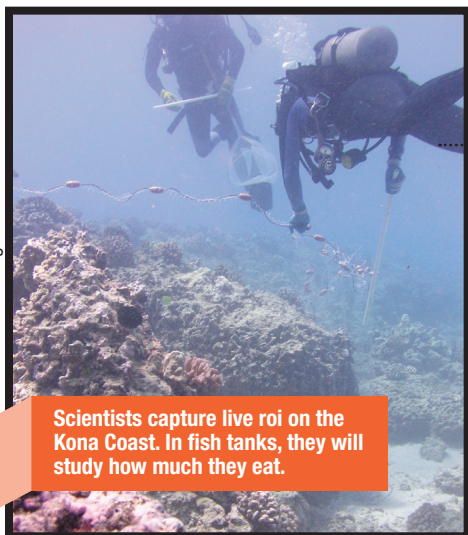
For years, Dierking has been studying just how much impact roi was having on local fish. By both studying fish in captivity and examining the stomach contents of fish caught in the wild, Dierking and others have been figuring out what they eat and how much. The good news in what he found is that individually roi eat far less compared to fish such as ulua. A roi that weighs slightly more than pound eats just an 1 ounce of fish every two weeks.

But Dierking also found because there are so many fish, roi collectively can eat quite a lot. "On (a 3-square-mile area of) the Kona Coast, we found roi eats 99 tons of reef fish each year," Dierking says. That is the **CONT. >>**

Roi, or Peacock grouper, is the grouper with the widest natural distribution of all 159 species in this family. The fact that it never naturally established successfully here illustrates how isolated Hawaii is. Here are some roi facts:

- ◆ Roi are protogynous hermaphrodites, which means they start life as females and later switch sexes to males.
- ◆ Roi take two years to become sexually reproductive and generally live in harems of 1 male and up to 12 females.
- ◆ Roi harems occupy fixed territories, which the male defends against intrusion from neighboring harems.
- ◆ In Hawaii, individuals were found up to 16 years of age in studies, with a depth range of 1 to 130.
- ◆ On the Kona Coast, the average density of roi is eight individuals per 11,000 square feet.

Source: University of Hawaii



Scientists capture live roi on the Kona Coast. In fish tanks, they will study how much they eat.

Photo: Jan Dierking

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Roi eat 99 tons of fish on the Kona Coast each year.
So why aren't the fish they prey on disappearing?

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equivalent of 8.2 million fish. "As a number, it is quite amazing." But Dierking says that amount does not appear to be a number that is impacting native reef fish negatively.

"Other reef fish seem to be doing quite well and increasing," he says.

Dierking says one possible reason for this are the low numbers of other predators on the reef, such as jack. One hypothesis is that roi took the role played by other predators before they were reduced by fishing.

"Roi seems to be filling a role opened up by humans," Dierking says, adding that predators are important to the reef to remove sick and diseased and maintain healthy populations across the board.

Dierking says he also found that roi predation is concentrated on very small prey sizes and that means the juveniles for species such as parrotfish and surgeon fish. In nature, he says, a high mortality rate is expected for juveniles and is the reason there is a much larger number of juveniles born than necessary to keep a species abundant. "Juvenile mortality rate is typically very large, even as high as 99 percent for some species," he says. "So it seems this is built into the system."

The main reason why people in Hawaii don't eat roi is because they believe it has a higher rate of ciguatera, a toxin that builds in some fish and causes illness when eaten by people.

Dierking says people are spot on about roi when it comes to ciguatera in Hawaii. He and his team speared 300 roi from the Big Island and Oahu and found 25 percent of the fish from the Big Island had high levels of ciguatoxin. The Oahu fish had 8 percent in the risky range. This is above normal for Hawaii fishes, which researchers have found to be in the 4 percent range.

"Fishermen are right. Roi is more highly ciguatoxic than most other species in Hawaii," he says. Dierking says some fishermen report that there are safe areas to fish roi, but he did not find any areas where the fish were ciguatoxin-free.

"No coastlines are safe," he says.

Roi can be ciguatoxic in other areas of the Pacific, and in fact, some areas such as Western Samoa or French Polynesia have incident rates for ciguatera fish poisoning that far surpass those in Hawaii. But Dierking says in other areas people fish for subsistence and because ciguatera is not lethal, people may take the risk. In Hawaii, that risk is not necessary, so people don't take it.

"So there is no viable way to create a fishery for it here," he says. But Dierking adds ciguatoxin levels can change over time. "It might make sense to reevaluate in the future. That situation can change."



ROI'S NICHE



The Hawaiian archipelago is extremely isolated from other islands and many species found elsewhere are not present in Hawaii.

In fact, nearly 25 percent of the fish found in Hawaii are found only here. In the 1950s, roi was introduced to Hawaii. Scientist thought that highly valued food fishes from other areas such as roi would help boost declining numbers in reef fish stocks in Hawaii.

Roi when introduced slowly established itself. But since the 1980s, its population has exploded, increasing 15-fold in the Main Hawaiian Islands. Today, studies report that it is the most dominant inshore predator in the Main Hawaiian Islands. Scientists do not believe though that its presence is negatively impacting local fish populations, instead it appears to be filling a role left open by over-fishing of other predators.

While in Hawaii roi is despised, in places like Hong Kong, restaurants can charge hefty prices if they can offer a live grouper such as roi. There, the fish can sell for almost \$10 per pound wholesale.



Photo: Julie McGowan/Timana



FishLife is produced by the
Division of Aquatic Resources
and funded by the Federal Aid in
Sport Fish Restoration Program.